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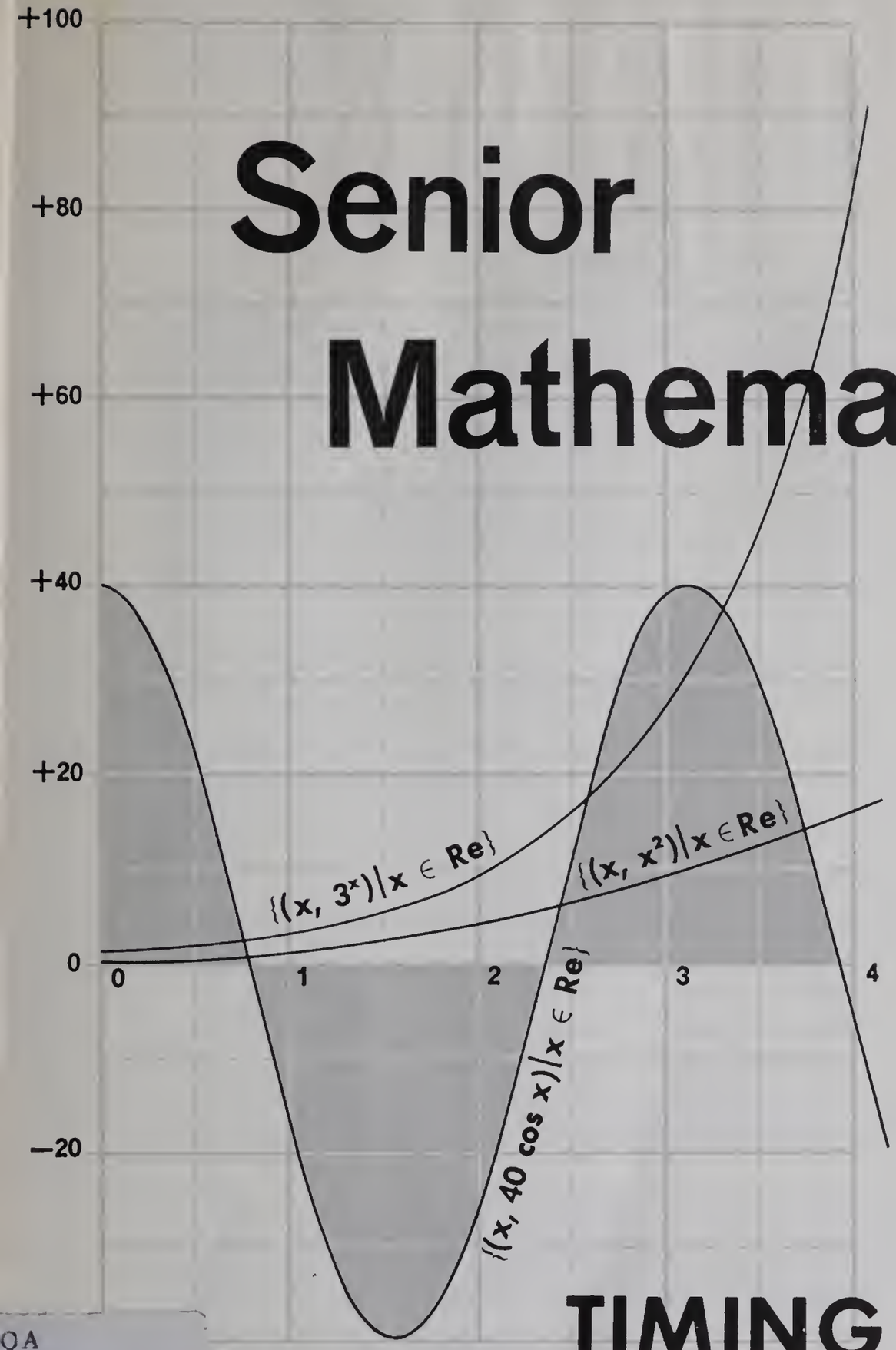

Senior Mathematics

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TIMING SCHEDULE

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Introduction

Senior Mathematics 2 has been written to conform to the Department of Education curriculum S12B and this timing schedule envisages that the 145 periods will be available as in the case of Grade 11. This includes 20 periods of chapter revision, but not final examination revision time. This unfortunately, does not allow very much spare time for slowing down at what may prove to be a difficult topic for a particular class. In curricula S12A and S12B much less time is allowed for synthetic Euclidean geometry than the full year previously alloted to that topic. We feel that in Grade 11 many teachers tended to expect as complete a coverage of synthetic geometry as was formerly the case; this was obviously impossible. The same situation applies here in Grade 12 and if time is required, it may be most usefully obtained by avoiding overindulgence in geometry. Certain basic geometrical facts are required in other courses; the properties of parallel lines and the associated angles, the Pythagorean theorem, similarity, and tangent properties are probably the most important.

In all sections, examples of various degrees of difficulty are given in the exercises. The teacher must exercise the right to choose from these examples a selection suited to the ability of a particular class. It cannot be overemphasized that it is not necessary for every pupil in every class to solve every example in every exercise. Care should particularly be used in assigning examples numbered in red. These are usually more difficult and should only be attempted by the most capable students.

Supplementary topics have been omitted from the timing schedule. The more interested and capable student should be encouraged to read these on his own with possibly some guidance from the teacher.

A considerable amount of the material in Chapters one and two is review of work already studied in Grade 11. With a capable class, some time may quite readily be saved here by dealing with more than one section per day. This would make it possible to allow more time for the newer topics or for dealing with some of the supplementary topics.

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Section	Periods	Topic	Exercises

CHAPTER 1 – RELATIONS

1-1	1	The Real-Number System	1-1
1-2		The Number Line	1-2
1-3	1	Equations Involving Fractional Coefficients	1-3
1-4	1	Equations Involving Literal Coefficients	1-4
1-5	2	Cartesian Coördinates	1-5
1-6		Binary Relations	1-6
1-7	1	Equations of Straight Lines	1-7
1-8	1	The Intersection of Straight Lines	1-8
1-9	1	Linear Equations with Literal Coefficients	1-9
1-10	1	Relations Defined by Inequalities	1-10
1-11	2	Chapter Summary	1-11
	11		

CHAPTER 2 – FUNCTIONS

2-1	1	Functions As Single-Valued Binary Relations	2-1
2-2	1	Functional Notation	2-2
2-3	1	Linear Functions Developed from Problems	2-3
2-4	1	Slope of a Line	2-4
2-5	1	Forming Equations of a Line	2-5
2-6	1	Reduction to the Form $y = mx + b$	2-6
2-7	2	Chapter Summary	2-7
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CHAPTER 3 – EXPONENTIAL FUNCTIONS

3-1	1	Positive Integral Powers of Same Base	3-1
3-2	1	Positive Powers of Different Bases	3-2
3-3	2	Real Bases and Integral Exponents	3-3
3-4	2	Positive Real Bases and Rational Exponents	3-4
3-6	1	Scientific Notation	3-6
3-7	1	Real Exponents	
3-8		The Exponential Functions	3-7
3-9	1	Growth Rates of Exponential Functions	3-8
3-10	1	Computations Using Graphs of $y = a^x$	3-9
3-11	2	Chapter Summary	3-10
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Section	Periods	Topic	Exercises

CHAPTER 4 – LOGARITHMIC FUNCTIONS

4-1	1	Calculations Using Graph of $y = 10^x$	4-1
4-2 }	1	The Graph of (x,y) $y=10^x, 0 \leq x \leq 1$, $x \in R$	4-2
4-3 }		$y = 10^x$ and $x = 10^y$	
		The Logarithmic Function	4-3
4-4	1	Rules for Logarithms	4-4
4-5	2	Tables of Logarithmic and Exponential Functions	4-5
4-6	2	Multiplication and Division	4-6
4-7	2	Computation of Roots and Powers	4-7
4-12	2	Chapter Summary	4-12
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CHAPTER 5 – SIMPLE AND COMPOUND INTEREST

5-1	1	Simple Interest	5-1
5-2	1	Compound Interest	5-2
5-3	1	Graphs of $A = P(1+ni)$ and $A = P(1+i)^n$	5-3
5-4	1	Present Value	5-4
5-6	1	Chapter Summary	5-6
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CHAPTER 6 – THE QUADRATIC FUNCTION

6-2	1	The Function Defined by $y = ax^2$	6-1
6-3	1	Parabolas with Equations $y = ax^2+d$ and $y = a(x-m)^2$	6-2
6-4	1	Parabolas with Equations $y = a(x-m)^2+d$	6-3
6-5	1	Completing the Square	6-4
6-6	1	Quadratic Inequalities	6-5
6-7	2	Maximum and Minimum Values	6-6
6-9	2	Chapter Summary	6-8
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Section	Periods	Topic	Exercises

CHAPTER 7 – THE QUADRATIC EQUATION

7-1	1	Introduction	7-1
7-2	2	Solving the Quadratic Equation	7-2
7-3	1	Special Quadratic Equations	7-3
7-4	1	Completing the Square	7-4
7-5	2	The Quadratic Formula	7-5
7-6	1	General Quadratic Equations	7-6
7-7 }	2	Character of the Roots	7-7
7-8 }		Nonreal Roots	7-8
7-9	2	Equations Involving Radicals	7-9
7-10	2	Problems	7-10
7-12	2	Chapter Summary	7-12
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CHAPTER 8 – POLYNOMIAL EQUATIONS

8-1	1	Introduction	8-1
8-2	1	Division of $P(x)$ by $x-a$	8-2
8-3	1	Zeros and Factors of Polynomials	8-3
8-4	1	Factor Theorem and Converse	8-4
8-5	1	Factoring Using the Factor Theorem	8-5
8-6	1	Factors of a Polynomial	8-6
8-7	1	Sum and Product of the Roots	8-7
8-8	1	Finding a Quadratic Equation with Given Roots	8-8
8-10	2	Chapter Summary	8-10
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CHAPTER 10 – THE CIRCLE

10-1	1	Definitions	10-1
10-2	1	Circumference, Arc Length, and Area	10-2
10-3	2	Properties of Chords	10-3
10-4	2	Sector Angle and Inscribed Angle	10-4
10-5	2	Concyclic Points	10-5
10-6	2	Cyclic Quadrilaterals	10-6
10-7	2	Tangents and Secants	10-7
10-8	2	Tangents from External Point	10-8
10-9	2	Angle between Chord and Tangent	10-9
10-11	2	Chapter Summary	10-11
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Section	Periods	Topic	Exercises

CHAPTER 11 – ANALYTIC GEOMETRY OF THE CIRCLE

11-1	1	Equation of a Circle, Centre the Origin	11-1
11-2	1	The Relation Defined by $x^2+y^2=r^2$	11-2
11-3	1	Interior and Exterior Regions	11-3
11-4	2	Analytic Proofs	11-4
11-5	1	Length of Tangent	11-5
11-6	2	Equation of a Tangent	11-6
11-7	1	Chapter Summary	11-7
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CHAPTER 12 – THE TRIGONOMETRIC FUNCTIONS

12-1	1	Trigonometric Functions of θ, $0 \leq \theta \leq 2\pi$	12-1
12-2	1	Trigonometric Functions of Any Angle	12-2
12-3	1	Positive and Negative Angles	12-3
12-4	1	Domain and Range	12-4
12-5	1	Graphs of the Sine and Cosine Functions	12-5
12-6	1	Zeros and Periodicity	12-6
12-7	1	Amplitude of $a \sin \theta$	12-7
12-8	1	Periodicity of $\sin k\theta$ and $\cos k\theta$	12-8
12-9	1	The Functions $a \sin k\theta$ and $a \cos k\theta$	12-9
12-10	1	The Phase of $a \sin (\theta + d)$	12-10
12-12	1	Chapter Summary	12-12
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CHAPTER 13 – THE SOLUTION OF TRIANGLES

13-1	1	The Right-Angled Triangle	13-1
13-2	1	The Law of Sines	13-2
13-3	1	The Law of Cosines	13-3
13-4	1	The Ambiguous Case	13-4
13-5	2	Applications of Trigonometry	13-5
13-6	2	Chapter Summary	13-6
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Section	Periods	Topic	Exercises

CHAPTER 14 – SEQUENCES AND SERIES

14-1	1	Definition of a Sequence	14-1
14-2	1	Deducing a Rule for a Sequence	14-2
14-3	2	The Arithmetic Sequence	14-3
14-4	2	The Geometric Sequence	14-4
14-5	1	Series and Sum of a Series	14-5
14-6	2	Sum of the General Arithmetic Series	14-6
14-7	2	Sum of the General Geometric Series	14-7
14-9	2	Amount of an Annuity	14-8
14-10	1	Present Value of an Annuity	14-9
14-11	1	Deferred Annuities	14-10
14-13	2	Chapter Summary	14-12
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